direction of these prolongations is variable. At the level of the median furrow presented by each of the ambulacral cords it is exactly transverse. We can then trace these prolongations even into the branches destined for the ambulacral tentacles. I may add that these cells are formed of a not very abundant homogeneous grey protoplasm surrounding a large clear nucleus. The cellular layer adheres intimately to the fibrous layer, so that they can only be separated from each other in the state of little fragments.

2. *Muscles.*—The most contradictory statements prevail with regard to the structure of the muscles of the sea-urchins. I have been able to ascertain that they are composed of very thin cylindrical fibres, perfectly smooth and homogeneous in the direction of their length. Thus, even by employing alcohol, osmic acid, hæmatoxylin, chromic acid, &c., I have not been able to discern the least trace of a transverse stria. These fibres present a fibrillar structure, and frequently one or more elongated nuclei applied to their surface; but they appear to be destitute of an enveloping membrane. They are birefringent and become vividly impregnated with colouring matters and osmic acid.

The fibres of the muscles of the lantern of Aristotle are implanted directly by a denticulated extremity upon the calcareous parts of the skeleton.

The muscles of the lantern and the muscular organs (intestine, ambulacral vesicles) undergo energetic contractions under the influence of electrical or mechanical excitation; but these contractions do not take place suddenly as in the case of striated muscles. It is very difficult to demonstrate the existence of the nerves which animate these muscles.—*Comptes Rendus*, Nov. 6, 1876, p. 860.

Physiological Experiments on the Functions of the Nervous System in the Echinida. By M. L. Fredericq.

By means of fine-pointed scissors five small cuts were made in the buccal membrane of an *Echinus lividus*, in such a manner as to divide the ambulacral nervous trunks near their origin in the collar. The ambulacral feet were not at all paralyzed; they moved in all directions and attached themselves to surrounding bodies; but the animal could no longer execute general movements or change its position, whilst other uninjured individuals could walk along the bottom of the aquarium and crawl up its glass front.

If an uninjured *Echinus* be turned so that its mouth is upwards, it moves its ambulacral feet until, in a few seconds or minutes, it will assume its normal position. After section of the ambulacral nerves the animal could no longer execute this combined movement, but remained indefinitely in its abnormal position. This is the effect of an insignificant mutilation. On the other hand the most serious lesions, if they do not reach the central nervous system, by no means prevent the urchins from using their ambulacral feet in the ordinary way; they turn themselves perfectly after many inci-

sions into the buccal membrane or the test, if these are made in the intervals between the courses of the nerves, and even after the removal of a considerable portion of the upper hemisphere of the test, containing the anus, a portion of the intestine and genital glands, the terminal nerve-cords and ambulacral vessels. All these results lead to the conviction that the cords described as forming the nervous system are the means by which harmony of movement is produced. Lastly the galvanization of an ambulacral nerve by means of the electrical forceps and induction-coil constantly causes the immediate retraction of all the ambulacral feet of the zone.

The following facts seem to be in favour of the existence of a nervous plexus in the skin which covers the outside of the test. If a certain spot in this integument be wounded or pricked, the spines and pedicellariæ within a certain radius immediately lower themselves towards the point irritated, evidently for the purpose of defence. This experiment succeeds equally well with fragments entirely detached from the animal. It is in the thickness of the external skin that the means of communication between the irritated point and the muscles moving the spines and pedicellariæ are situated; for by cutting the integument with a fine scalpel, the space that takes part in the above defensive movements may be limited. The author, however, has apparently been unsuccessful in his search for this assumed nervous plexus.—*Comptes Rendus*, Nov. 13, 1876, p. 908.

On the Motile State of Podophrya fixa. By M. E. Maupas.

Claparède and Lachmann were the first to recognize the real organization of the Acinetina, for which they created the order of Infusoria Suctoria. These authors regarded them as essentially fixed organisms; and the Acinetina thus became isolated among their relatives.

The observations of the above-named naturalists upon the ciliated embryos of these Infusoria, with those of Stein, Cienkowski, and others, showed, however, that this isolation was not so profound as had been supposed at first: during their youth the Acinetina are motile and furnished with vibratile cilia.

The author's observations, which he regards as fitted to bring together more closely the Suctoria and Ciliata, were made upon *Podophrya fixa*, Ehr., which can at pleasure pass from the motile to the fixed state. They were made in November 1875 and October 1876 upon *Podophryæ* obtained from the rivulets of Frais-Vallon near Algiers.

Whether free or fixed, the body of *Podophrya fixa* is always more or less globular, sometimes quite spherical. The suckers are distributed pretty regularly over the whole body, except only a small region of the periphery, always corresponding to the part of the body where the contractile vacuole is situated.

After observing some of these *Podophryæ* for from half an hour to an hour, the author saw the suckers slowly drawn into the body; and